Tracking Aliens In The Schoolyard

Subject: Life science, mapping

Grade: 6-8

Lesson Topic: Habitats, plant structure

Length: 1-2

Learner Objective:

Students will understand that weeds are everywhere.

Students will become familiar with the structures, plants, and signs of habitats around their schoolyard.

Students will use a drawing of their schoolyard to organize and understand spatial distances and relate that information to the occurrence of alien weed species.

Introduction:

This lesson is intended as an introductory lesson to the mapping lessons found elsewhere in the *Aliens In Your Neighborhood* curriculum. One of the skills to be learned, especially with younger students, is awareness for spatial distances. Alien weed species can take advantage of a wide range of habitats, and can cause problems on the small scale of school property as well as within the larger environment. Mapping the location and number of alien weed species is one way that scientists track the spread of invasive plants.

Content:

All of the map views used in the anticipatory set are a "bird's eye" view of the places we live. This view of our world allows us to imagine large areas and the spatial relationships (where things are in relation to each other) between objects. Relating the area being mapped to the larger world is done by indicating both scale (distances represented on the map) and heading (normally the cardinal direction North). Younger students need to understand that a North arrow pointing up doesn't mean in the air, but in the direction you would be heading if you walked towards the Earth's north pole.

Materials and Supplies:

Clipboards, paper, pencils/markers, rulers
Compass
100' measuring tape (surveyor's tape)
Student Map View sheet (at end of lesson)

Anticipatory Set:

Depending on age group, begin with a series of maps – the globe, the United States, a state map, a county map, a city map, and if available, the school property map. Older students will conceptualize this "zooming in" view and you may want to start with USGS topographic maps or local surveyor's maps of the property. This "map view" of their world can be done outside if the weather permits (tape the maps in series to the side of a building).

Activity Outline:

The student's first maps may be as simple as a sketch of the buildings and trees from the perspective of a bird. Students can be given a sheet of paper, draw a 7" square, and draw what they believe this bird's eye view would be like (or use the student map view sheet at end of this lesson). Have the students use the compasses to make sure their maps are oriented to north. It will not take long for the students to discover that things "don't fit" and that objects need to appear not only in terms of their relative distance from each other, but also in terms of scale.

If you have access to the surveyor's map of the school property you can make copies for the students (enlarge or reduce to fit your needs, or copy sections of the map into convenient 8"x10" sheets so that each student may only do a portion of the entire area). These maps have a specific scale, and the surveyor's tape can help the students visualize how the map scale translates to objects on the ground. Students may add as much detail as they feel is important, but at the least they should indicate major structures, major planting areas, sidewalks and parking areas, and if possible, basic features of terrain like creeks or hills. The initial sketches should be done lightly in pencil. Once the students are satisfied with their maps they can color code their map using markers in the classroom. Talk to the class about creating a map key and the importance of using a key that is easy to use and, more importantly, easy for others to read. Let the students design a uniform key for the entire class to use.

Using knowledge gained from their alien plant research, flash cards of weed plants, or other sources of identification, have the students mark the locations of weed species. Younger students might just use a colored marker to put a dot "where the weed is next to the office," or similar simple representations of weed locations. Older students may want to identify specific survey points and measure the distance from that point to each weed to find the location on their scaled maps. At the highest level, this activity may be adapted to give practice using GPS waypoints before going into the field and doing the large scale projects discussed in the NatureMapping section of this curriculum.

Students may wish to color code the different weed species. This should be a requirement at most grade levels. Once the maps are completed the students should examine the color-coded plants and look for patterns and groups of plants. Where are they growing? Where are they growing in relation to other features? Have the students draw a line around groups of common species. What relationships are found now? Can you tell if a species is growing in particular direction (in terms of numbers of plants)? Encourage a full class discussion and allow the students to list all possible patterns and relationships?

Closure and Assessment:

If the area was sectioned into small parcels for individuals or teams to map, reassemble the maps on the wall of the classroom. If a scale was used accurately, the maps should all "go back together" in a coherent manner, and similarly, the color-coding will be consistent and the key will be understood by all.

If time, have students orally present their maps, and encourage them to discuss their method, problems encountered, things they have learned after taking a bird's eye view of their school, and if they notice any particular patterns of where the weed species are growing.

Assessment may be in the form of a rubric which scores 1) map components (scale, features, distance, color codes, and key), 2) behavior and attention (including involvement while outside, use of equipment, and teamwork), and 3) oral presentation of findings.

Independent Practice and Related Activities:

Students with high levels of spatial relationships, distance, perspective can be encouraged toward higher levels of complexity in their mapping, to map other or larger areas, to include topography and other advanced mapping techniques, and to serve as mentors for their peers. Regardless of grade level, mapping activities consistently have higher levels of complexity for students who require additional challenges.

Examine the list of patterns and relationships created during the classroom discussion. Each one of these patterns or relationships provide an opportunity to ask further questions and/or design an experiment to test whether or not the patterns and relationships are perceived or authentic. These experiments may be conducted by an individual student, or as an extension for the entire class to pursue.

Interview administrative and custodial staff to see how invasive plants might be a problem and what evaluate the associated costs of control (labor & materials) and damage.

Use this activity as an introduction to NatureMapping.

Resources:

NatureMapping Unit

TerraServer Imagery (for maps of your area) http://terraserver.microsoft.com

USGS Map Wizard http://interactive2.usgs.gov/learningweb/fun/map.asp

Vocabulary:

GPS, habitat, map view, scale, topographic

National Science Education Standards:

Science as Inquiry - CONTENT STANDARD A:
As a result of activities in grades 5-8, all students should develop
- ❑ Abilities necessary to do scientific inquiry
- ❑ Understandings about scientific inquiry

Life Science - CONTENT STANDARD C:
As a result of their activities in grades 5-8, all students should develop understanding of
- ❑ Structure and function in living systems
- ❑ Populations and ecosystems
- ❑ Diversity and adaptations of organisms

Science and Technology - CONTENT STANDARD E:
As a result of activities in grades 5-8, all students should develop
- ❑ Abilities of technological design
- ❑ Understandings about science and technology

History and Nature of Science -CONTENT STANDARD G:
As a result of activities in grades 5-8, all students should develop understanding of
- ❑ Science as a human endeavor
- ❑ Nature of science
- ❑ History of science

Map View

Name _____ Date _____

Location _____

Place an arrow that points to North **N**
(see example below)

Key:

SCALE: _____ = _____ (You must designate unit of measurement, ex. 1 cm = 5 m)

North symbol example: **N**